



Cluster and Pilot Lines at ASML

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Workshop on Smart Regional Financing for Key Enabling Technologies - 6 November 2014

Agenda

- Introduction
- ASML cluster
- ASML and KET pilot lines

ASML in a nutshell: machines for making chips

ASML

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6 November 2014



- Lithography is the critical tool for producing chips
- All of the world's top chip makers are our customers
- The chips in your computer, tablet or smartphone were probably made on our systems
- 2013 sales: €5.2 bln
- > 13,000 employees (payroll and flex)

ASML in 30 years

ASML

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Slide 4

1984



Total market: €463 million
Employees: 31
Locations: 2 (NL, US)
Sales: € 1.2 million
R&D: € <5 million

2014



Total market: €6 - 7 billion
Employees: > 13,000
Locations: 70 in 16 countries
Sales: €5.3 billion (2013)
R&D: € 1 billion (est) (80% NL)

30

6 November 2014

A global presence

ASML

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Slide 5
July 2014



Vision, Mission, Strategy

ASML

Public
Slide 6
July 2014

1

Vision:

ASML makes possible affordable microelectronics that improve the quality of life.

2

Mission:

1. ASML invents and develops complex technology for high-tech lithography machines for the semiconductor industry.
2. ASML's guiding principle is continuing Moore's Law towards ever smaller, cheaper, more powerful and energy-efficient semiconductors that drive our customers' competitiveness.



3

Strategy:

1. Our success is based on three pillars: technology leadership, combined with Customer and Supplier intimacy, high efficient processes and Entrepreneurial people.
2. We operate in a safe environment where we care for people, planet and our local communities.
3. Our company is an inspiring place where employees work, meet, learn and share.



High R&D spending to sustain technology leadership



1980s:

PAS 2000/5000

R&D: 50 mln €



1990s:

PAS 5500

R&D: 400 mln €



2000s:

TWINSKAN

R&D: 1500 mln €



2010s:

NXE EUV

R&D: 2000 mln €

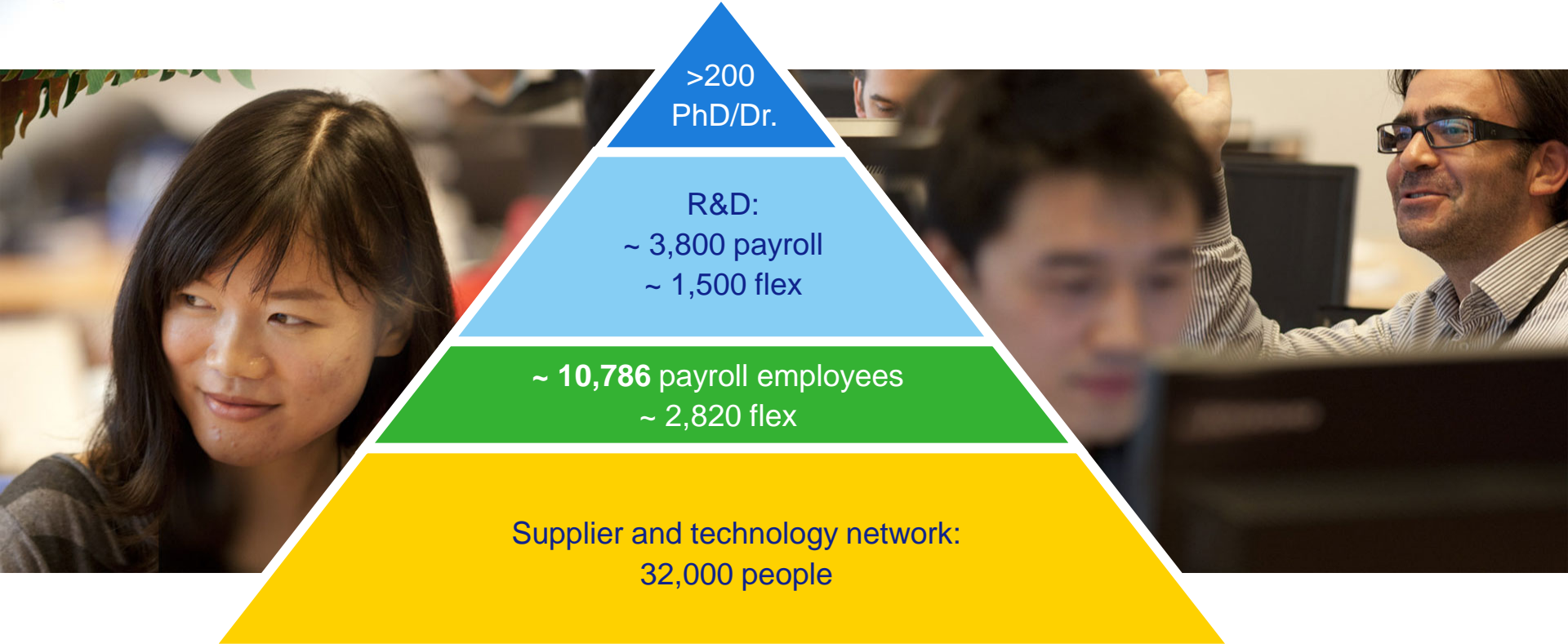
Great people in an integrated supply chain

ASML

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Agenda

- Introduction
- **ASML cluster**
- ASML and KET pilot lines

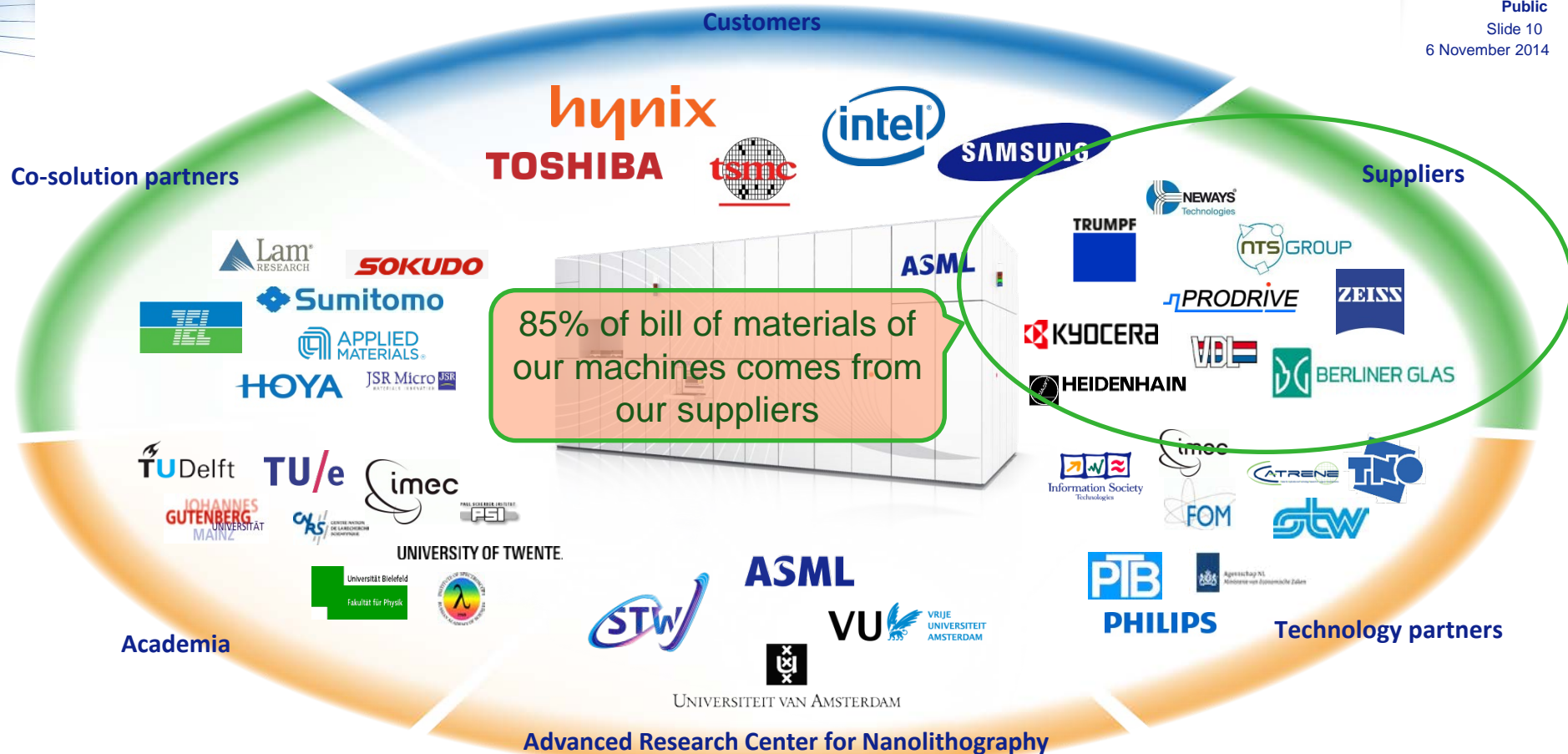
ASML supplier landscape

ASML

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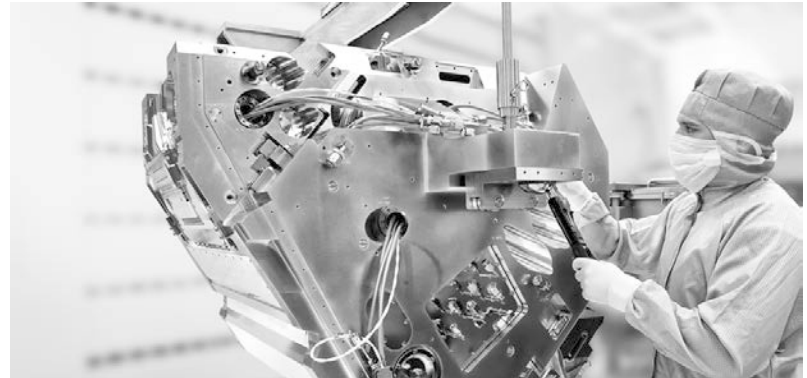
ASML relies heavily on suppliers

- ASML sources >75% of its product related parts from Europe – most of the spend goes to The Netherlands and Germany
- The ASML supplier clusters comprises hundreds of suppliers with a wide variety
 - Mechatronics
 - Measurement, performance and control
 - Mechanical
 - Ceramics and glass
 - Lenses and illumination
 - Frames and mechanics
 - Electrical
 - Environmental control and infrastructure
 - Electronics and software

Also suppliers of ASML have important clusters

An example is Carl Zeiss SMT in Germany

- Carl Zeiss SMT has a supplier cluster with hundreds of active suppliers and more than 90% are from Europe
- The Carl Zeiss SMT Supply Chain Partner main areas of expertise and competence comprise amongst others
 - Mechanics
 - Mechatronics
 - Optics
 - Electronics



What does ASML expect from its supply chain?

ASML expects

Traditionally,

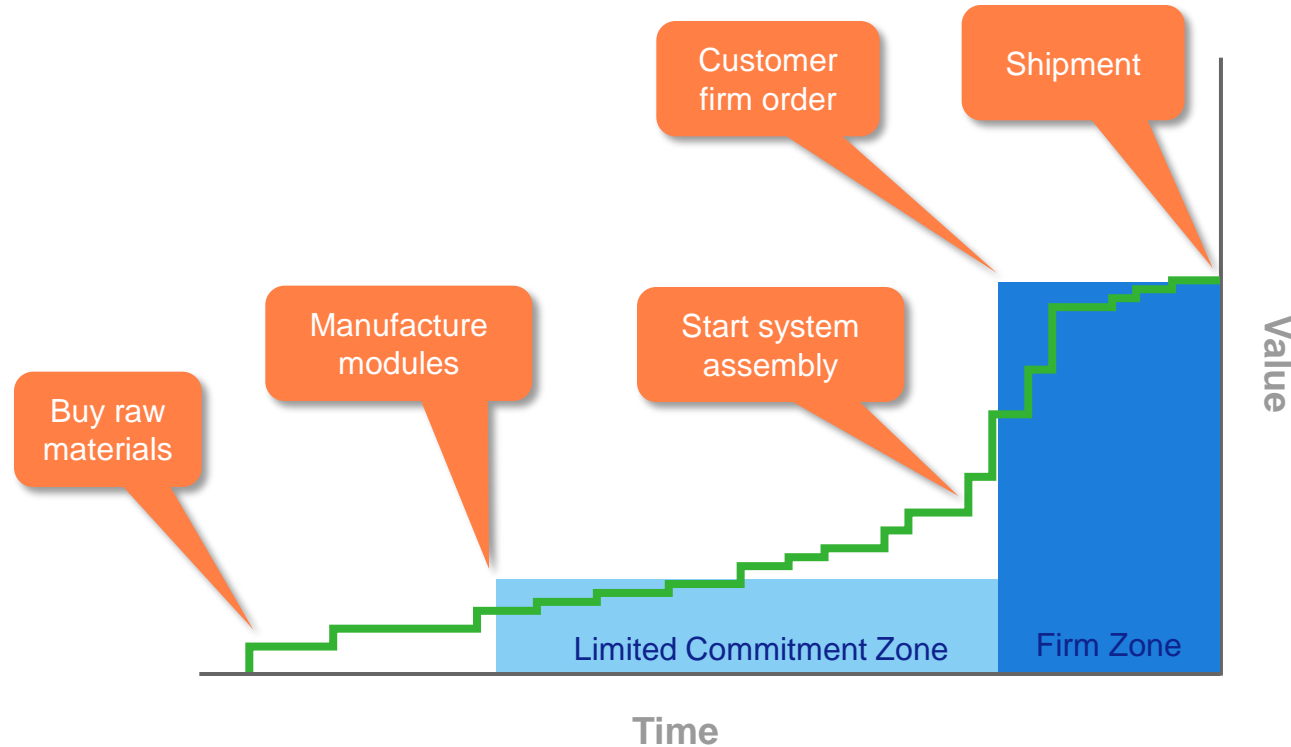
- continuous improvement (QLTC)

but increasingly:

- supporting ASML by executing its non-core activities and taking ownership
- flexibility to support diversified needs per ASML platform - from innovation to lowest costs

To that end, ASML and its suppliers are redefining “supplier collaboration”

Sharing risk and reward



Suppliers bear some of the risk and participate in the rewards.

Mutual transparency ensures that risks are well understood and minimized.

“QLTC” sourcing model (Quality, Logistics, Technology, Cost) means that suppliers do not compete solely on cost.

Continuous improvement: QLTC has served us well for more than 10 years

ASML corporate strategy

> 98 % Tool Availability
Focus on Sustainability

Towards 3 months
Customer Leadtime ASML

Relentless R&D Investment
Fast Time to Market

Adequate Cost Reduction
Creation Value of Ownership

Q

L

T

C

ASML's Supplier requirements

Qualified Production processes
Product (Design) Qualification

Short Lead Times
Capacity and Flexibility

Advanced Technology
Efficient Operations
Integrated Supplier Network

Competitive Pricing
Sharing Market Dynamics

Now diversified needs per ASML platform (1) are required

ASML wants to drive litho performance for its most innovative platforms, and therefore

- wants to integrate the best technologies available
- looks at suppliers for innovations from their domain of expertise
- requires suppliers to be involved at an early stage of the development
- would like suppliers to be at close proximity

However, a significant part of ASML's business is based on mature platforms and drives on lowest costs for its customer. Therefore, ASML

- wants the lowest Total Costs of Ownership

Diversified needs per ASML platform (2)

Total Costs of Ownership ('TCO') is the total of all direct and indirect costs that ASML can reasonably attribute to a Product supplied, including but not limited to:

- Product price, and costs due to
- obsolescence and lost sales due to long order lead times
- packaging, handling and transportation
- testing and qualification
- installation
- refurbishments
- for storage
- Product quality
- insufficient fitness for use
- warranty
- account management
- suppliers' learning curves

Redefining supplier collaboration

Define new

- Scope of work, new division of responsibilities (TCO, development, innovation)
- Business model, incentives, suppliers to take ownership
- Governance and sharing of information (business context, road maps, cost-drivers during design)

while insisting on continuous improvement (Q,L,T,C)
to create more value with and for the supply chain

Redefining:

Scope

Business model

Governance

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Redefining supplier collaboration: two cases

Suppliers take responsibility for module development ...



Manufacturing the wafer handler at VDL Enabling Technologies Group

VDL ETG has recently assumed full design and manufacturing responsibilities for the wafer handler in ASML systems.

The move from “build to print” to OEM will generate better margin for supplier and a lower total cost for ASML.

... and can adapt technology for other markets



VDL Enabling Technologies Group makes wafer handlers:

Knowledge on positioning and temperature management was leveraged for other customers in semiconductors, solar panels and LED lighting.



Prodrive makes advanced digital processing and power systems:

Technology developed for ASML was re-used in products for medical, consumer electronics and transport markets.

Agenda

- Introduction
- ASML cluster
- ASML and KET pilot lines

ASML coordinates several ENIAC and ECSEL JU KET pilot line projects

The projects contribute directly to the European Strategic Roadmap for Micro- and Nano-Electronics Systems



- Proof of concepts of wafer stage technologies
- Development of state of the art pilot line facility readiness
- Further optimization of front-end equipment prototypes
- Metrology equipment performance enhancement to improve 300 mm CoO for 12 nm control on 450 mm by increase of measuring throughput

ENIAC JU project: EEM450PR

- Development of next generation lithography module development fulfilling 10nm node requirements
- Front end equipment development: viz. plasma ion implant module, plasma dry etch module, RTP system, single wafer cleaning system, single wafer FEOL deposition equipment
- Metrology alpha tools for dielectric film thickness and composition, defect inspection and analysis, CD, wafer overlay, 3D metrology; wafer handling and automation support
- Resulting in (multi site) pilot line processing

ENIAC JU project: E450EDL

- Lithography supply chain module dev/pilot activities
- EUV tool integration and preliminary qualification
- Metrology beta wafer and mask platforms dev, data handling, holistic metrology
- IMEC onsite pilot line N10 layer exposure and holistic processing

ENIAC JU project: E450LMDAP

- EUV lithography scanner development to achieve 7nm module patterning specification
- Metrology platforms development & qualification for N7's 1D, 2D and 3D geometries
- Introduction of a large number of new materials for the 7nm technology modules
- Full N7 integration with electrical measurements to enable validation of the 7nm process options for HVM

ECSEL JU project: SeNaTe*

* Under evaluation
by the ECSEL JU

Essentials of ENIAC and ECSEL JU KET pilot line projects

	EEM450PR	E450EDL	E450LMDAP	SeNaTe*
Number of consortium members	28	41	42	42
Countries involved	9	11	6	6
Start date	April 2, 2012	October 1, 2013	October 1, 2014	April 1, 2015
Duration (months)	36	36	36	36
Total effort (person.years)	408	867	2073	1195
Total eligible costs (million €)	84.2	204.5	459.5	182
ENIAC funding (million €)	14.0	30.6	68.8	
National funding – all countries (million €)	15.0	30.2	34.9	

* Under evaluation
by the ECSEL JU

ASML suppliers in ENIAC JU KET pilot lines projects

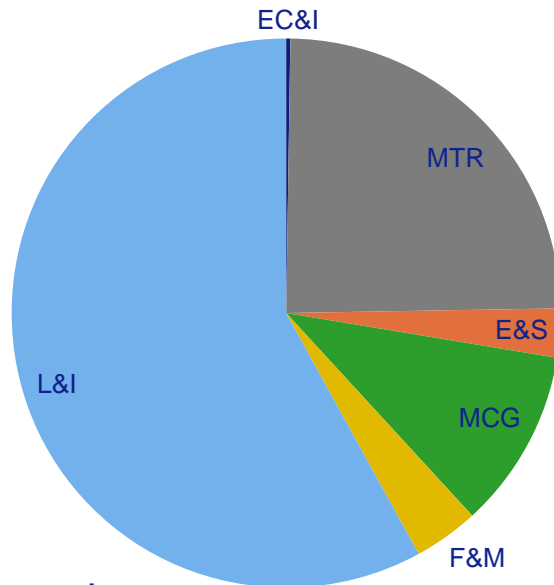
AAE B.V.	Institute	Development of manufacturing technology for high accuracy mechanical parts
ASYS GmbH & Co. KG	SME	Robot design for next generation exposure tool
Benchmark Electronics B.V.	SME	Development of validation test tooling
Berliner Glas KGaA, Herbert Kubatz GmbH & Co	Corporate	Contamination control, advanced sensors, additive manufacturing
Bosch Rexroth BV	Corporate	Stages and handlers motion control
CCM Centre for Concepts in Mechatronics B.V.	SME	Wafer handling advanced thermal control, additive manufacturing
Integrated Dynamics Engineering GmbH	SME	Vibration isolation development
Irmato Industrial Solutions Eindhoven BV	Corporate	High tech mechatronic modules
KMWE Systems Eindhoven B.V.	SME	High accurate precision parts
MOGEMA 't Harde B.V.	Corporate	Improvement of vacuum chambers
Neways Advanced Applications B.V.	Corporate	High accuracy/speed steering devices
Prodrive B.V.	Corporate	Electronic motion control
Reden B.V.	SME	Modelling & simulation
SEGULA Technologies Nederland B.V.	Corporate	Mechatronics
TNO	Institute	Contamination control, Scanning probe microscope technology
Delft University of Technology	Institute	Micro spectrometer
VDL Enabling Technologies Group B.V.	Corporate	Wafer handler, additive manufacturing
Carl Zeiss SMT GmbH	Corporate	Optical systems

Many suppliers participate together with ASML in the KET pilot line projects

- to enhance their competences
- to develop components and modules
- to support the realization of N10 exposures with state of the art lithography tools in the imec pilot line

ASML suppliers in running ENIAC JU KET pilot lines projects

Supplier spending in competence areas



L&I: Lenses & illumination

EC&I: Environmental control, & infrastructure

MTR: Mechatronics

E&S: Electronics & software

MCG: Machines: ceramics & glass

F&M: Frames & mechanics

Supplier total spending in running
KET Pilot line projects:

210 million Euro

Total ENIAC JU funding:

32.3 million Euro

Thank you for your attention

The image features the ASML logo in a bold, dark blue, sans-serif font. The logo is positioned on the left side of the frame. The background is a light blue gradient with abstract, flowing white lines that create a sense of movement and depth, resembling stylized waves or a modern architectural design.

ASML